

# Generation of Electricity through Speed Breakers using Rack and Pinion Mechanism

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## Abstract

In the present day scenario, power is the major need for day to day human life as well as every sector of economy. The day-to-day increasing population and decreasing conventional sources for power generation, provides a need to think on non-conventional energy resources. Roads and highways in India are provided with speed breaker to control the speed of traffic in congested areas. This energy loss on speed breakers can be utilized for useful purposes. Here in this paper we are looking forward to conserve the kinetic energy that go wasted, while vehicles move across speed breakers this paper describes the potential of such type of energy available on roads and its utilization for useful work. The mechanism to generate and store energy produced that can be further used for desired purpose is elaborated.

**Keywords: Rack and pinion, Speed Breaker Plate, Universal Joint , Shaft , Gears , Energy Resource**

## I. INTRODUCTION

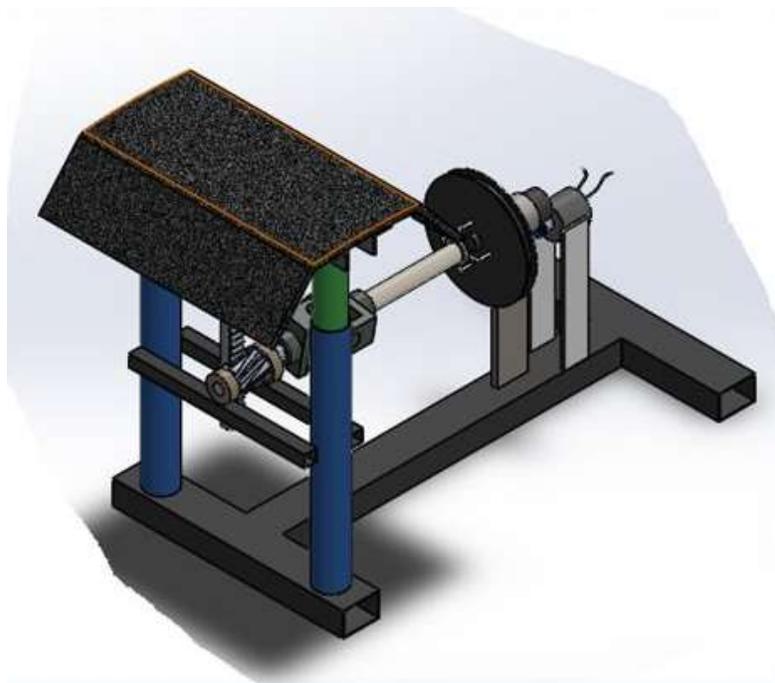
The number of vehicles passing over the speed breaker in roads is increasing day by day. A large amount of energy is wasted at the speed breakers through the dissipation of heat and also through friction, every time a vehicle passes over it. There is great possibility of tapping this energy and generating power by making the speed-breaker as a power generation unit. The generated power can be stored and used to illuminate the lamps, near the speed breakers. Places such as Toll bridges, vehicle parking stands are best suitable for its utilization. The methods to generate electricity through road ribs are as follows:

- 1) Using Crank-shaft mechanism.
- 2) Using Roller mechanism.
- 3) Using Rack- Pinion mechanism.
- 4) By moving a magnet in a coil under the road ribs.

## II. METHODOLOGY



## III. PROPOSED MODEL



#### IV. COMPONENTS AND MATERIAL SUGGESTED

COMPONENT	MATERIAL SUGGESTED
SPEED BREAKER PLATE	Cast Iron (can easily sustain vibrations)
FRAME	Cast Iron (can easily sustain vibrations)
SPRINGS	Mild steel ((0.04 % to 0.3 % C ) ( Higher shear strength / less Stiffness/compressive strength is good).
RACK AND PINION	Mild Steel (oil quenched) SAE 3220. (High capacity to handle heavy load and high stress.)
SHAFT	Stainless Steel
UNIVERSAL JOINT	Stainless Steel
FLYWHEEL	Cast Iron
GEARS	Oil Quench Steel

#### V. WORKING PRINCIPLE

This arrangement explains the mechanism of electricity generation from speed breakers. When vehicle passes over speed breaker plate, springs get compressed and the rack moves vertically downwards and in turn rotates pinion. Thus reciprocating motion is converted into rotary motion using the rack and pinion arrangement. The pinion is connected to shaft and shaft transfers motion to flywheel via universal joint to store the energy. This is given to dynamo, through gears which converts mechanical energy into electrical energy. The generator uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsating direct electric current it is a device, which converts mechanical energy into electrical energy. That energy is stored into battery and the inverter is used to convert DC to AC which can be used for lightning up the lights.

#### VI. POWER CALCULATIONS

Let us consider, the mass of a vehicle moving over the speed breaker = 120Kg (Approx.)

Height of speed brake = 10 cm

Work done = Force x Distance

Where,

Force = Weight of the Body

= 120 Kg x 9.81m/s<sup>2</sup>

= 1177.2 N

Displacement = height of speed breaker

Output power = Force \* Displacement

= (1177.2 x 0.1)/60

= 1.962 Watts

Power developed for 1 vehicle passing over the speed breaker arrangement for one minute

= 1.962 watts

Power developed for one hour = 117.72 watts

Power developed for one day = 2.825 Kw.

#### VII. ADVANTAGES

- Pollution free power generation.
- No manual work necessary during generation.
- Energy available all year round.
- No consumption of any fossil fuel which is non-renewable source of energy.

#### VIII. CONCLUSION

Electricity plays a very important role in our life. Due to enormous increase in population, the present power generation techniques/processes have become inadequate to accomplish our requirements. In this project we discover technology to produce electricity from speed breakers, where the system produced is trustworthy and will help in conserving our natural resources. The overall goal was to design the speed breaker System while keeping the engineering in check.

In previous models, the shaft was not able to sustain high loads which was overcome in this model by adding a universal joint. In near future this technique will prove a huge bonus to the world, as the generated power can be used for illuminating Street Lights, Road Signals, Signboards Lighting of the check post on the highways etc. As the conventional sources are depleting quickly, it's high time to consider alternative resources. So this system not only endows with alternative but also adds to the better economy of the country.

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### REFERENCES

- [1] Piyush Bhagdikar, Shubham Gupta, Navneet Rana, R. Jegadeeshwaran , GENERATION OF ELECTRICITY WITH THE USE OF SPEED BREAKERS International Journal of Advances in Engineering & Technology, May, 2014. ©IJAET ISSN: 22311963589.
- [2] Aniket Mishra, Pratik Kale, Atul Kamble, Electricity Generation from Speed Breakers The International Journal Of Engineering And Science (IJES) ||Volume|| 2 ||Issue|| 11 ||Pages|| 25-27 ||2013|| ISSN (e): 2319 – 1813 ISSN (p): 2319 – 1805 www.theijes.com The IJES Page 25.
- [3] Sharma, P.C., “Non-conventional power plants”, Public Printing Service, New Delhi, 2003.